Electronic Power Specification Standardization (EPSS)

Open Systems Project Engineering Conference (OSPEC)

FY 98 Status Review

29 April - 1 May 1998

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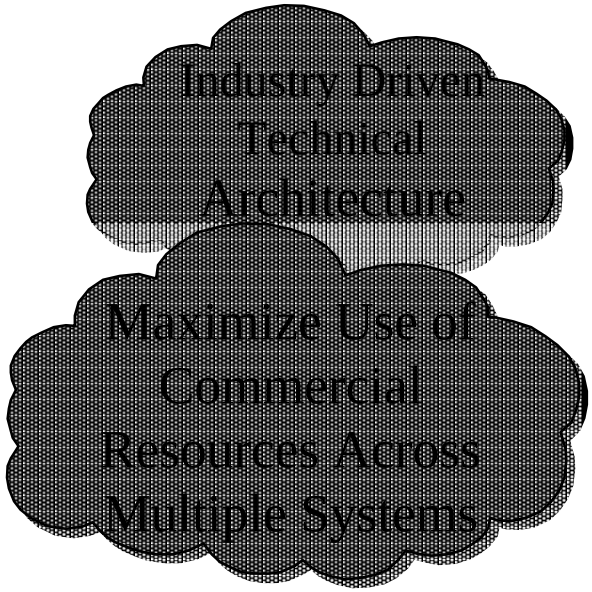
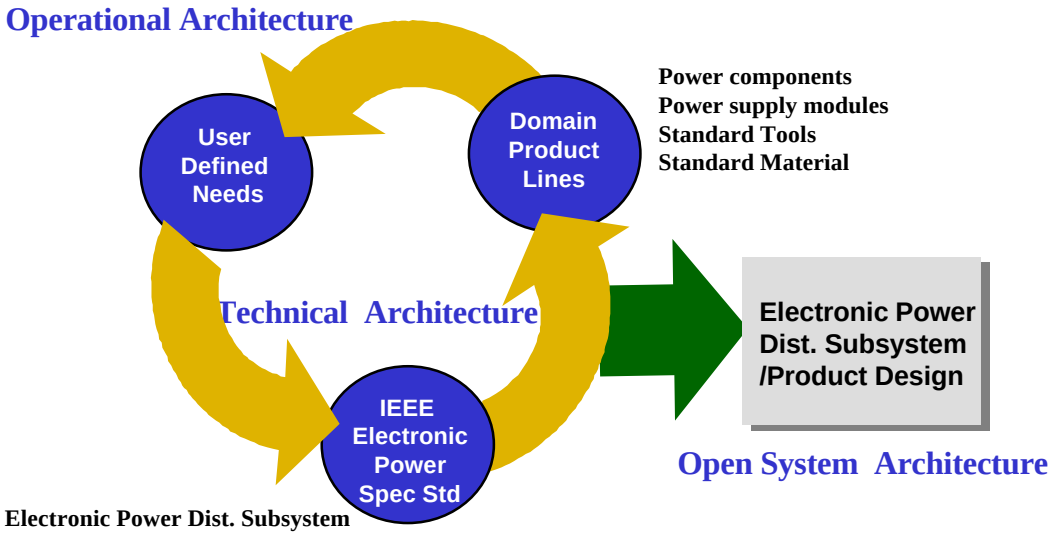
EPSS Description

Intra-operability Concept



Electronic Power Dist. Subsystem Development Process



Electronic Power Dist. Subsystem

- **Architecture Building Codes**
- **Standard Parameter Specification Language**

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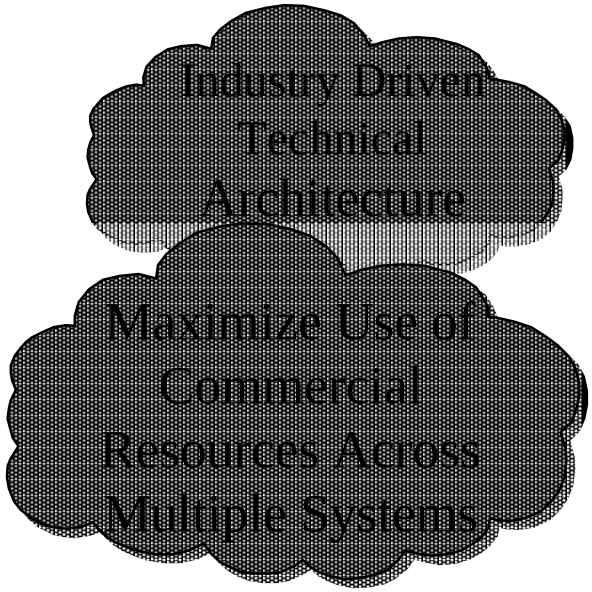

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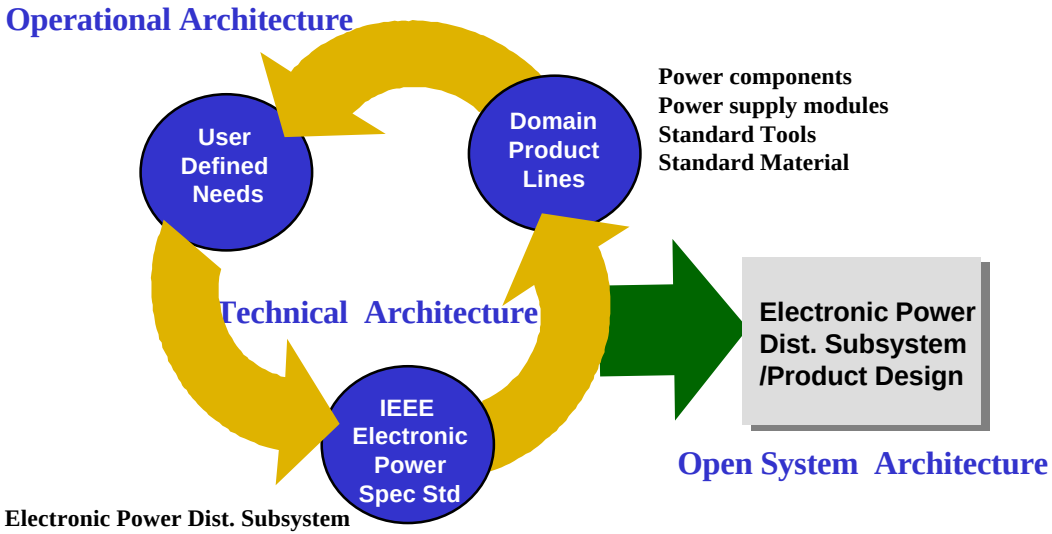


Electronic Power Dist. Subsystem

- **Architecture Building Codes**
- **Standard Parameter Specification Language**

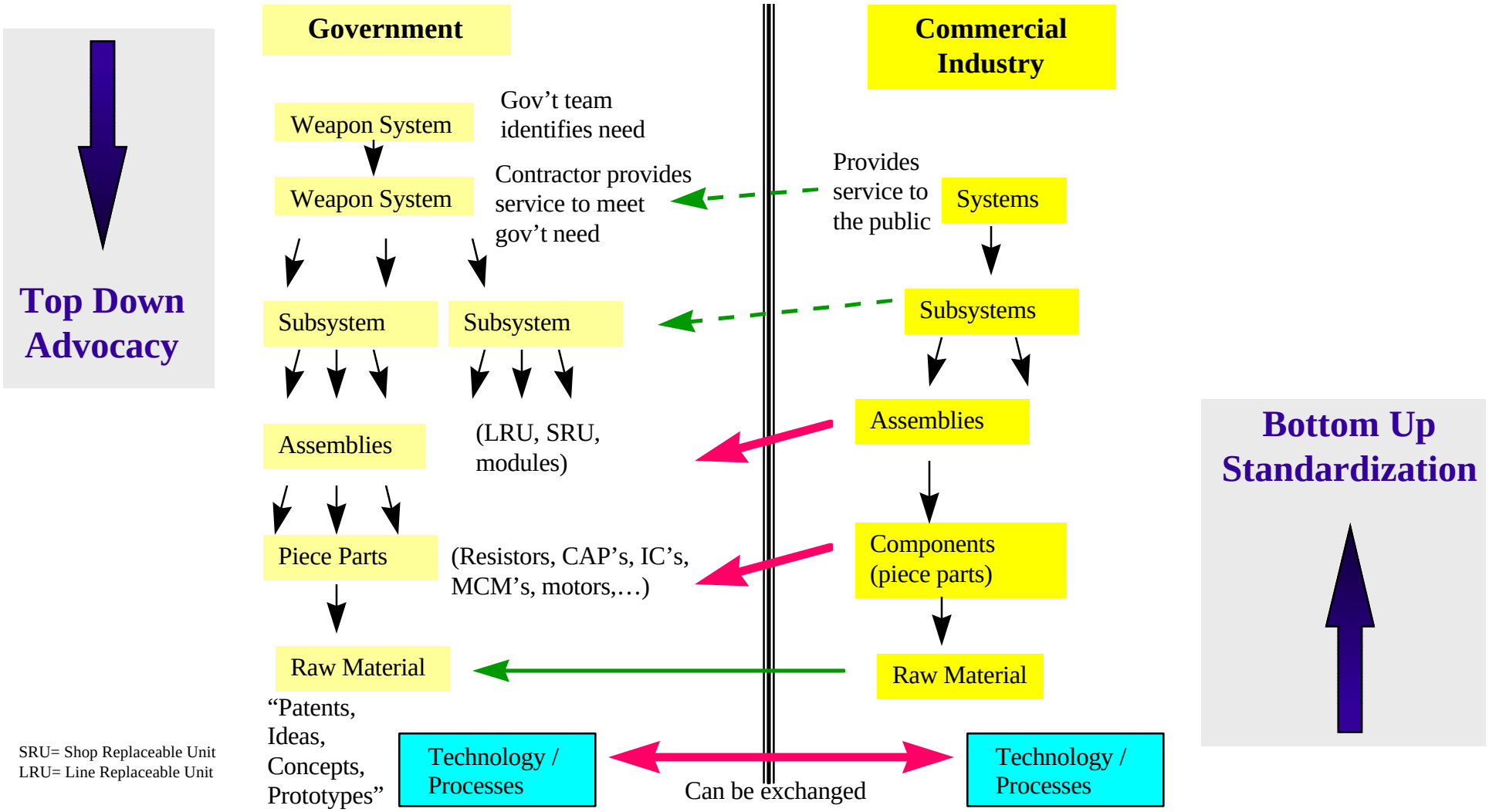
Task:

Develop a series of commercial based broadly used standards which define:

- ***Specification Language:*** *test parameters, conditions, and methods to impart integrity in product development, characterization, and advocacy*
- ***Building Codes:*** *purposeful common sense rules and / or specifications to govern interfaces*

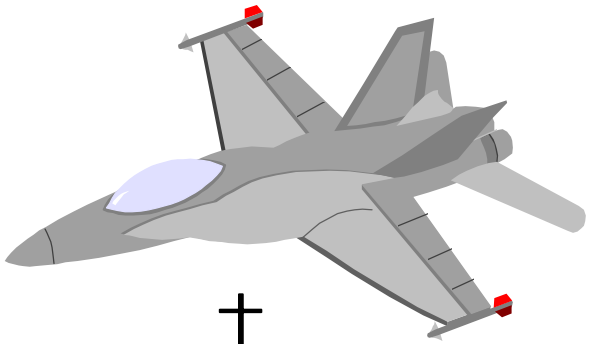
EPSS Approach

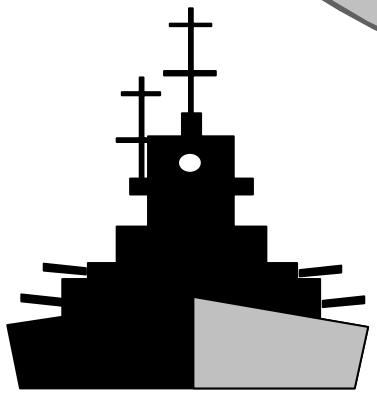
Focus on Harmonizing Interfaces & Broad Usage



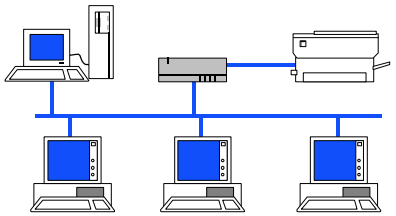
SRU= Shop Replaceable Unit
LRU= Line Replaceable Unit

EPSS Paradigm Facilitates the Approach

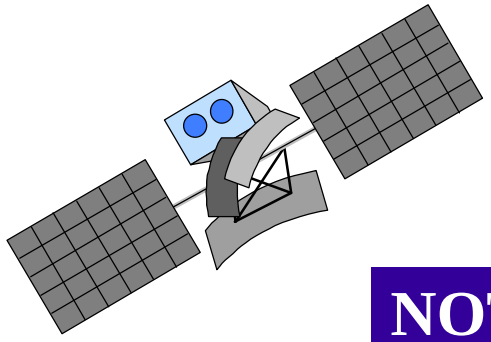


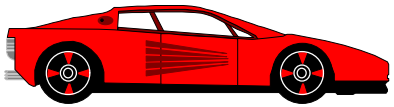


Electronic Power Distribution Systems are found in virtually all electronic hardware



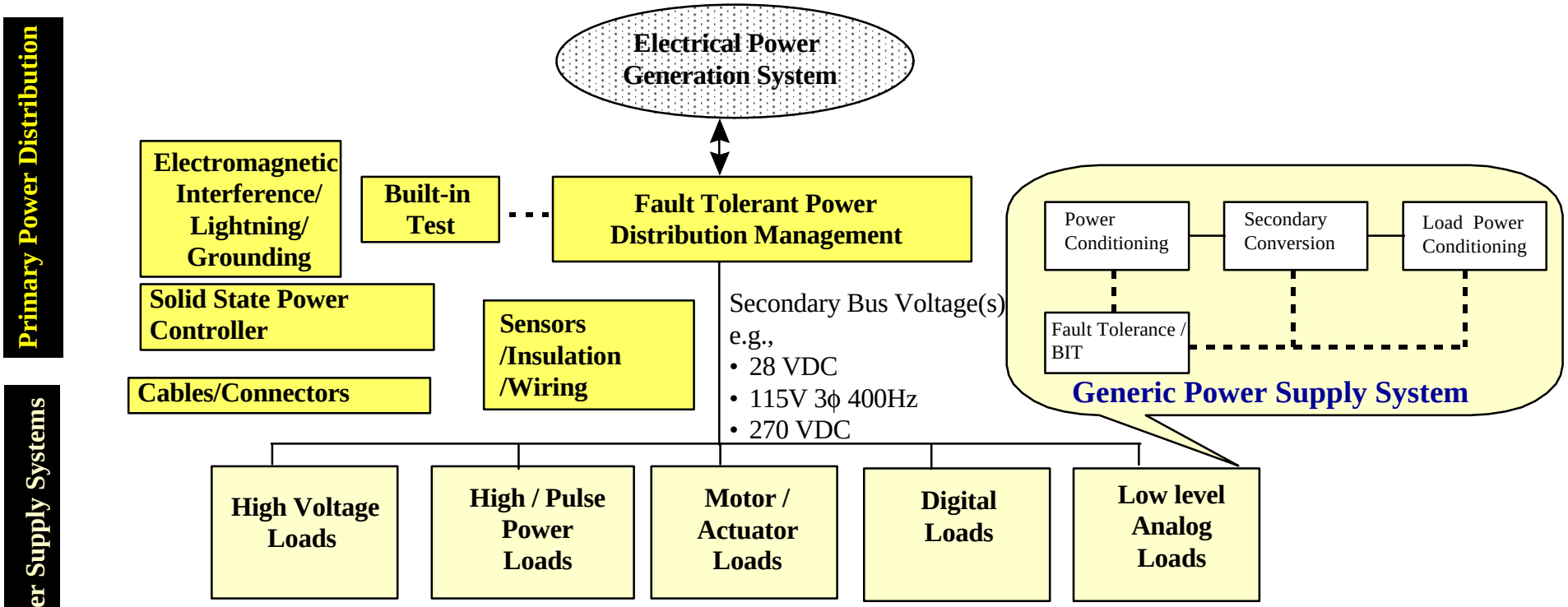
Purpose in all applications is to provide regulated service voltages that are required by the functional electronic systems





NOT PRODUCT DISCRIMINATORS

EPSS Pay-offs



- Recommend to government how to enhance reusability, quality, performance, testability of power distribution systems
- Enable industry/DOD to acquire cost-effective power distribution system products
- Leverage industry based EPSS building codes for other electronic systems

Key Results

Key to better affordability is to leverage commercial resources

37 Organizations,
Over 100 people,

from DoD, Military Industry, Commercial Industry

→ **IEEE P1515 Working Group Established to Develop the Specification Language**

→ **Commercial Industry is Actively Supporting**

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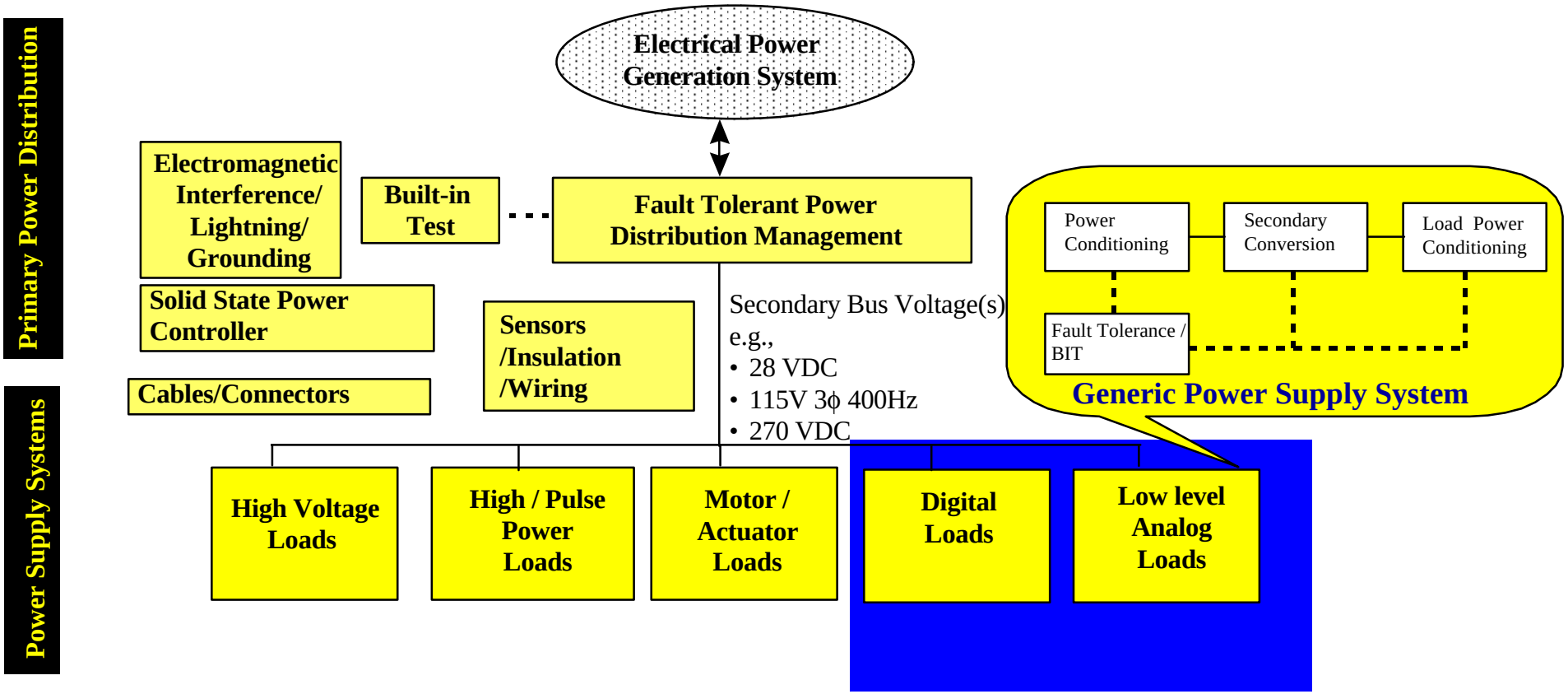
7 Government Contractors →

Held EPSS Consortium Workshop to identify hurdles to developing commercial based building codes

→ **Determine how to best leverage Commercial Resources**

Tasks Application Domain

P1515 Specification Language has broad applicability



EPSS Consortium Building Codes must be focused

DC/DC Power Supply Market Share: *Military 9%*
Industrial & Telecommunication 53%

Key Results

Industry is actively participating and willing to provide solutions

- **P1515 Specification Language Recommended Practice**
  - **91 total parameters indentified**
  - **36 parameters have been accepted by volunteers**
  - **5 companies have volunteered**
  - **7 others are in the process of determining which parameters to develop**
  - **Established IEEE P1515 FTP site**
  - **Obtained PSMA Interest**

- **EPSS Consortium Building Codes**
  - **Identified 7 problems which inhibit "more cost effective" power supply systems**
  - **Identified the hurdles to removing the 7 problems**
  - **Developed the EPSS Consortium Objective and Task List**
  - **Obtained PSMA Interest**

PSMA = Power Supply Manufacturers Association

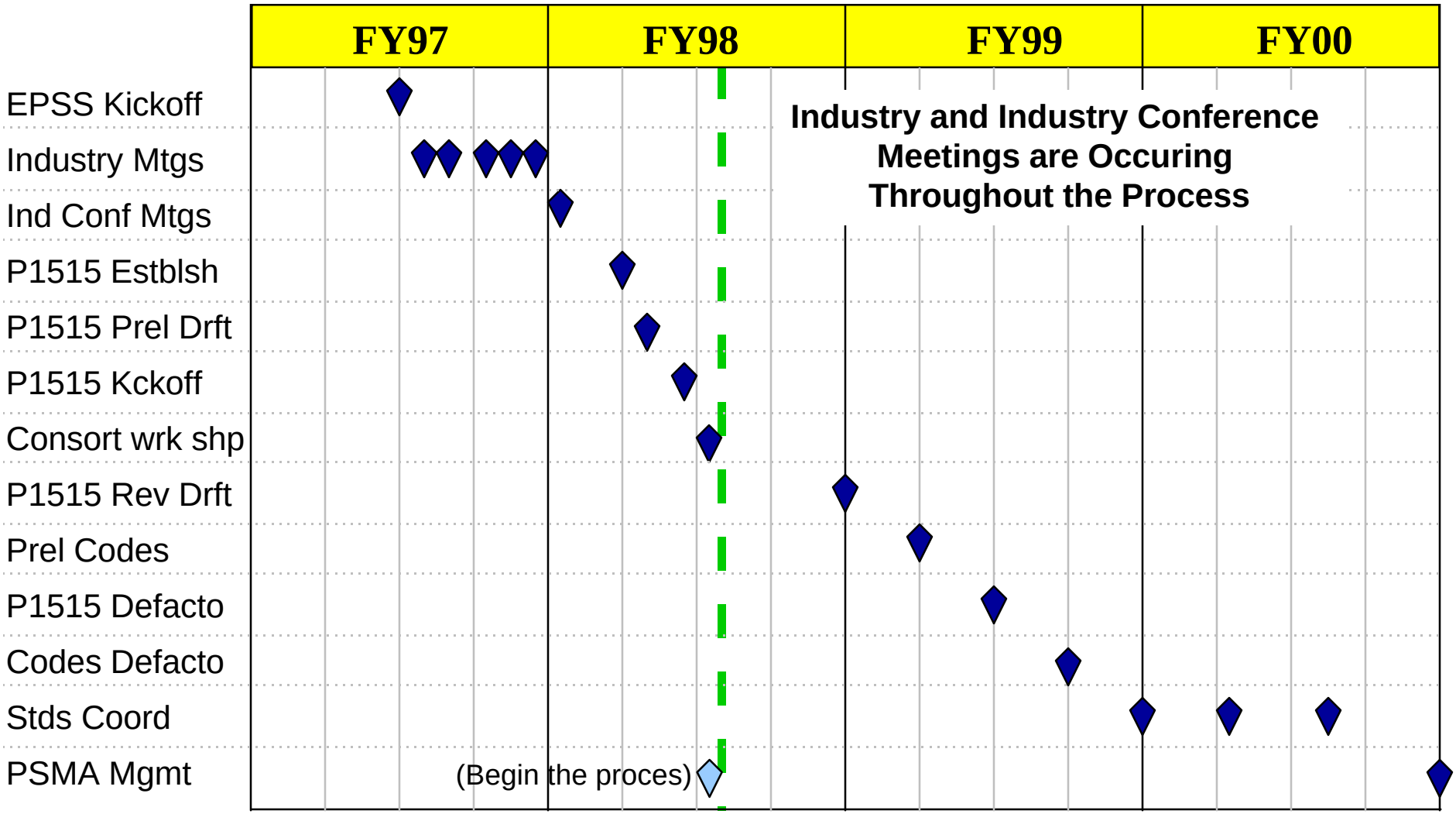
EPSS Consortium's "7 Problems" for Resolution

Problems Related Leveraging Commercial Resources…

Electronic Power Distribution Subsystem Government Contractor Perspective

- Lack / Level of Testing
- Lack of Reliability, Maintainability, Supportability, and Interchangeability Confidence
- Lack of Configuration Management Coordination
- Documentation….availability and sufficiency
- Insufficient / Questionable Performance …..electrical, mechanical, and environmental
- Lack of Data Sharing
- Business Practices

Schedule



PSMA = Power Supply Manufacturers Association

Issues

- **Commercial industry is apprehensive about participating in military “sponsored” standard activities**

…..BUT needs and wants “power supply system” Specification Language and Building Codes

- **Military industry is apprehensive about use of commercial based resources (components, processes, standards)**

…..BUT needs and wants to be able to utilize commercial resources

- **Power Supply Manufacturing Association (PSMA) is interested in talking about their participation in the development of Specification Language and Building Codes…. BUT are not willing to commit at this point**

Recommendations

- **Continue to sponsor IEEE P1515 Working Group activities with emphasis on letting industry "drive" the development**
  - **Assign Action items and monitor status**
  - **Interface with IEEE, PSMA, and industry to obtain volunteers to develop P1515**
  - **Support volunteers efforts**
  - **Help expedite P1515 Specification Langauge Recommended Practice Ratification**
  - **Establish PSMA (industry organization) as the maintainer of this IEEE "standard"**

Enable industry to promote and maintain the "standards"

Recommendations

- **Continue to sponsor the “power supply system” building code consortium activity**
  - **Respond to the “7 problems” identified during the EPSS Consortium Workshop**
  - **Dessiminate concensus resolutions to government and industry**
  - **Establish purposeful relationship with PSMA**
  - **Establish a “standard” set of building codes for use by “power supply system” developers and users (DoD and Industry)**
  - **Establish PSMA (industry organization) as the maintainer of this “standard”**
- **Determine applicability of these building codes to other electronic systems**

Enable industry to promote and maintain the “standards”

Back Up Slides

Commercial Power Supply Industry Trends

Parameters	Today	By Year 2002
Requirements		
Cost	$0.25 to $1 per watt	$0.15 to $0.50 per watt
Size	2.4” x 4.6” x 0.5” - 300W 2.25” x 1.5” x 0.5” - 50W	50% reduction
Input Voltage	24V, 48V	Same
Output Voltage	3.3V, 5V, 15V	1.5V, 2.2V, 3.3V, 5V, 15V
Reliability	1-10 Megahrs (MTBF)	20 Megahrs (MTBF)
Efficiency	85 - 90%	90+%
Packaging		
PWB	• Less through hole • Insulated Metal substrates	• More direct chip attach, and increasing surface mount • More metal core boards (IMS)
Thermal	Natural and forced convection	Improved heat spreaders, and natural and forced convection
Integration		• **Higher densities with standard pinouts** • **Standard Blocks** • More printed components • **Increased modularity** • Multi-chip modules

Reference: Power Technology Roadmap, by Don Staffiere, Jim Sarjeant, 15-19 February 1998, Applied Power Electronics Conference and Exposition (APEC), page 3-8.

1998 Calendar of Events

Title	Purpose	Date	Location
IEEE P1515 and 1998 EPSS Working Group Kickoff	Held in conjunction with the Advanced Power Electronics Conference (APEC). Status and direction briefing will be provided. Group rules will be established and assignments and due dates agreed to.	15 and 16 February 1998	Anaheim, CA
EPSS Consortium Kickoff Meeting	Status and direction briefing will be provided. Group rules will be established and assignments and due dates agreed to.	15, 16 April 1998	Dayton, OH
Open Systems Conference	Present status to the Office of the Secretary of Defense (OSD) on the EPSS activity	29, 30 April and 1 May 1998	Alexandria, VA
EPSS Consortium and P1515 Working Group Meeting	Held in conjunction with the National Aerospace and Electronics Conference (NAECON). The purpose will be a Technical Interchange meeting regarding the P1515 recommended practice, and a status and discussion session concerning the EPSS consortium.	13-14 July 1998	Dayton, OH
P1515 Working Group Meeting	Held in conjunction with the International Telecommunications and Energy Conference (INTELEC). The purpose will be a Technical Interchange meeting regarding the P1515 recommended practice	4-8 Oct 1998	San Francisco, CA
Year End Review	Held in conjunction with the Digital Avionics System Conference (DASC). The purpose of this meeting will be to summarize EPSS progress and accomplishments, and to recommend future activities.	31 Oct to 6 Nov 1998	Seattle, WA

P1515 Activity

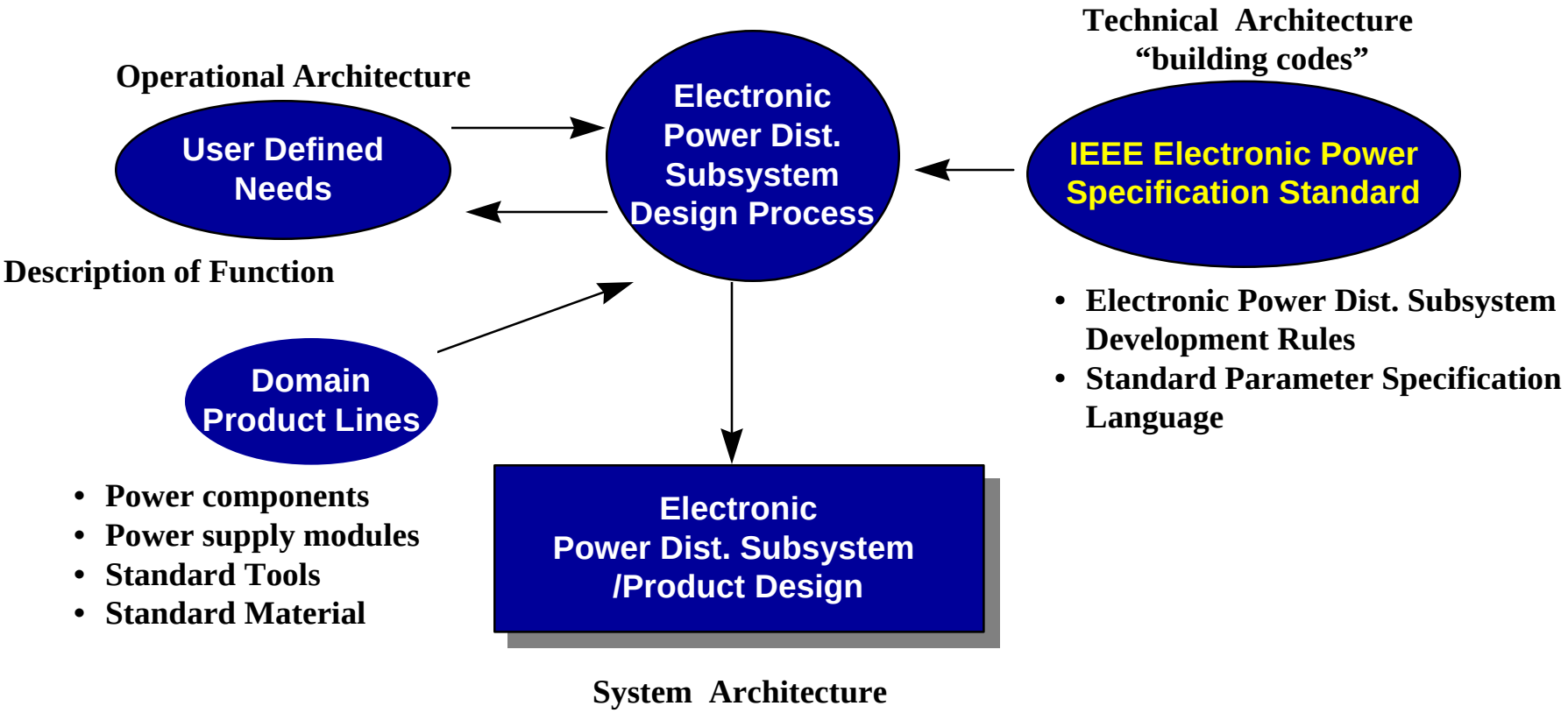
- **Broad Industry usage**
  - **DC/DC systems**
  - **single phase or three phase AC/DC systems**
  - **Power levels up to 20KW**
  - **Voltage levels up to 600V**
  - **Fequency up to 400Hz**
- **Abridged Preliminary Draft Standard Complete**
- **Advanced Conversion Technologies, Boeing, Raytheon, Sundstrand, and TRW have committed to developing a portion of the P1515 Recommended Practice**

P1515 Status

The following is the latest status on the P1515 activity:

- **We have 36 parameters covered out of 91**
- **The volunteers are: TRW, Sundstrand Aerospace, Raytheon Systems Co., Boeing Co., Advanced Conversion Technologies**
- **The companies that have reported interest but not yet committed are: Vicor, Lambda, Eldec, Rockwell Collins , EG&G, GEC-Marconi, and Lockheed Martin.**

New Paradigm for the Power Subsystem Development Process



- **EPSS is focused on developing Technical Architectures**
- **Usage of Technical Architectures facilitates the use of BCP**
  - **Military 9% of power supply market**
  - **Telecommunications 42% of power supply market**

Technical Architectures / Building Codes Already Exist

- **Each development organization essentially follows its own basic building codes ("technical architecture"), or development rules**
- **Knowledge base can be enhanced and used across the industry if "power supply system" organizations would pool their resources to develop a common base for development of electronic power distribution subsystems.**
  - **Knowledge base could span: Parameter Definitions, test conditions, test methods, piece parts, power quality capabilities, connectors, footprints, allowable dissipation, deratings, architecture elements, etc.**

Therefore, the question is <u>not</u> whether an EPSS technical architecture(s) needs to be developed but rather how much of one's respective "technical architectures" will electronic system developers want to share

EPSS Consortium Objective

Facilitate the identification and resolution of technical and business case issues necessary to better harmonize the efforts of commercial and government power supply developers, manufacturers, integrators, and users.

EPSS Consortium Tasks

- **Support the completion of IEEE P1515 Recommended Practice**
  - **Standard data sheet (s) can be developed using P1515**
- **Develop a set of recommendations to DoD to modify procurement policies affecting power supplies to make it possible to use more commercial resources.**
  - **resultant may be that the modified procurement policies will have applicability to more than just power supplies**
- **Expand Consortium membership**
  - **Commercial, Telecommunication, and Industrial power supply vendors (Large, medium, and small)**
  - **Actively involve DoD (AF, Army, Navy, Marines, NASA)**
  - **Establish the EPSS Consortium as a recognized body**
  - **Involve PSMA**

EPSS Consortium Tasks

- **Establish an industry led coordination group for the development and maintenance of “power supply system” defacto building codes**
- **Determine the hurdles of using commercial / industrial items in military power (supply) systems**
  - **“Items” include practices, components, products, and processes**
  - **Evaluate the cost benefit**